

Penn Cambria Curriculum

Course Name	Keystone Algebra 2
Length of Course	1 credit 1 period per day in 18 week block schedule
Grade Level	9 -12
Prerequisites	Algebra 1
Course Description	Algebra II is designed to be an extension and application of graphic and algebraic solutions of linear equations first defined and introduced in Algebra I. The algebra curriculum will focus on a greater emphasis of conceptual understanding, on algebra as a means of representation, and on algebraic methods as a problem-solving tool.
Units of Study	Equations and Inequalities, Linear Equations and Functions, Linear Systems and Matrices, Quadratic Functions and Factoring, Polynomials and Polynomial Functions, Rational Exponents and Radical Functions, Exponential and Logarithmic Functions, Counting Methods and Probability
Materials	Text: <u>Larson Algebra 2</u> c2011 Holt, McDougal Supplemental Materials:

- Curriculum document contains alignment to the Final **Draft** PA Academic Standards for Mathematics dated 1/29/2010.

Unit 1: Equations and Inequalities

Estimated Time: 11 Days

Standard Alignment:

- 2.1.11.A. - Model and compare values of irrational and complex numbers.
- 2.1.11.D. - Use exponential, scientific, and calculator notation to represent any rational number.
- 2.1.11.E. - Apply the concepts of prime and composite polynomials to determine GCFs (Greatest Common Factor) and LCMs (Least Common Multiple) of polynomials.
- 2.2.11.C. - Evaluate numerical expressions that include the four basic operations and operations of powers and roots, reciprocals, opposites, and absolute values.
- 2.5.11.B. - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas, and results.
- 2.8.11.B. - Evaluate and simplify algebraic expressions and solve and graph linear, quadratic, exponential, and logarithmic equations and inequalities, and solve and graph systems of equations and inequalities.

Curricular Objectives:

A. Expressions

- a. Apply properties of real numbers
- b. Evaluate and simplify algebraic expressions

B. Equations and Inequalities

- a. Solve linear equations
- b. Rewrite formulas and equations
- c. Use problem solving strategies and models
- d. Solve linear inequalities
- e. Solve absolute value equations and inequalities

Assessments/ Measurement of Objectives:

- Objective tests and quizzes
- Classroom exercises (independent practice)
- Homework exercises

Suggested Methods of Instruction / Learning Activities:

- Direct Instruction
- Drill-and-practice – Classroom exercises
- Independent or cooperative projects
- Authentic application exercises
- Peer tutoring

Unit 2: Linear Equations and Functions

Estimated Time: 12 Days

Standard Alignment:

- 2.2.11.C. - Evaluate numerical expressions that include the four basic operations and operations of powers and roots, reciprocals, opposites, and absolute values.
- 2.6.11.E. - Make predictions based on lines of best fit or draw conclusions on the value of a variable in a population based on the results of a sample.
- 2.8.11.B. - Evaluate and simplify algebraic expressions and solve and graph linear, quadratic, exponential, and logarithmic equations and inequalities, and solve and graph systems of equations and inequalities.
- 2.8.11.C. - Recognize, describe and generalize patterns using sequences and series to predict long-term outcomes.
- 2.8.11.D. - Demonstrate an understanding and apply properties of functions (domain, range, inverses) and characteristics of families of functions (linear, polynomial, rational, trigonometric, exponential, logarithmic).
- 2.8.11.E. - Use combinations of symbols and numbers to create expressions, equations, and inequalities in two or more variables, systems of equations and inequalities, and functional relationships that model problem situations.
- 2.8.11.F. - Interpret the results of solving equations, inequalities, systems of equations, and inequalities in the context of the situation that motivated the model.

Curricular Objectives:

A. Relations and Functions

- a. Represent relations and functions
- b. Find slope and rate of change

B. Coordinate Plane

- c. Graph equations of lines
- d. Write equations of lines
- e. Model direct variation
- f. Draw a scatter plot and best-fit line
- g. Graph linear inequalities in two variables

Assessments/ Measurement of Objectives:

- Objective tests and quizzes
- Classroom exercises (independent practice)
- Homework exercises

Suggested Methods of Instruction / Learning Activities:

- Direct Instruction
- Drill-and-practice – Classroom exercises
- Independent or cooperative projects
- Authentic application exercises
- Peer tutoring

Unit 3: Linear Systems and Matrices

Estimated Time: 12 Days

Standard Alignment:

- 2.2.11.C. - Evaluate numerical expressions that include the four basic operations and operations of powers and roots, reciprocals, opposites, and absolute values.
- 2.8.11.B.- Evaluate and simplify algebraic expressions and solve and graph linear, quadratic, exponential, and logarithmic equations and inequalities, and solve and graph systems of equations and inequalities.
- 2.8.11.C. - Recognize, describe and generalize patterns using sequences and series to predict long-term outcomes.
- 2.8.11.D. - Demonstrate an understanding and apply properties of functions (domain, range, inverses) and characteristics of families of functions (linear, polynomial, rational, trigonometric, exponential, logarithmic).
- 2.8.11.E. - Use combinations of symbols and numbers to create expressions, equations, and inequalities in two or more variables, systems of equations and inequalities, and functional relationships that model problem situations.
- 2.8.11.F. - Interpret the results of solving equations, inequalities, systems of equations, and inequalities in the context of the situation that motivated the model.

Curricular Objectives:

A. Linear Systems

- a. Solve linear systems by graphing
- b. Solve linear systems algebraically
- c. Graph systems of linear inequalities

B. Matrices

- a. Perform basic matrix operations
- b. Multiply matrices
- c. Evaluate determinants
- d. Apply Cramer's Rule

Assessments/ Measurement of Objectives:

- Objective tests and quizzes
- Classroom exercises (independent practice)
- Homework exercises

Suggested Methods of Instruction / Learning Activities:

- Direct Instruction
- Drill-and-practice – Classroom exercises
- Independent or cooperative projects
- Authentic application exercises
- Peer tutoring

Unit 4: Quadratic Functions and Factoring

Estimated Time: 14 Days

Standard Alignment:

- 2.1.11.B. - Use factoring to create equivalent forms of polynomials.
- 2.2.11.C. - Evaluate numerical expressions that include the four basic operations and operations of powers and roots, reciprocals, opposites, and absolute values.
- 2.8.11.B. - Evaluate and simplify algebraic expressions and solve and graph linear, quadratic, exponential, and logarithmic equations and inequalities, and solve and graph systems of equations and inequalities.
- 2.8.11.D. - Demonstrate an understanding and apply properties of functions (domain, range, inverses) and characteristics of families of functions (linear, polynomial, rational, trigonometric, exponential, logarithmic).
- 2.8.11.F. - Interpret the results of solving equations, inequalities, systems of equations, and inequalities in the context of the situation that motivated the model.

Curricular Objectives:

A. Graph Quadratics

- a. Graph quadratic functions in standard form
- b. Graph quadratic functions in vertex or intercept form

B. Solve Quadratics

- a. Solve _____ by factoring
- b. Solve _____ by factoring
- c. Solve quadratic equations by finding square roots
- d. Perform operations with complex numbers
- e. Solve quadratic equations by completing the square
- f. Use the Quadratic Formula and the discriminant

Assessments/ Measurement of Objectives:

- Objective tests and quizzes
- Classroom exercises (independent practice)
- Homework exercises

Suggested Methods of Instruction / Learning Activities:

- Direct Instruction
- Drill-and-practice – Classroom exercises
- Independent or cooperative projects
- Authentic application exercises
- Peer tutoring

Unit 5: Polynomials and Polynomial Functions

Estimated Time: 10 Days

Standard Alignment:

- 2.1.11.B. - Use factoring to create equivalent forms of polynomials.
- 2.2.11.C. - Evaluate numerical expressions that include the four basic operations and operations of powers and roots, reciprocals, opposites, and absolute values.
- 2.8.11.D. - Demonstrate an understanding and apply properties of functions (domain, range, inverses) and characteristics of families of functions (linear, polynomial, rational, trigonometric, exponential, logarithmic).
- 2.8.11.F. - Interpret the results of solving equations, inequalities, systems of equations, and inequalities in the context of the situation that motivated the model.

Curricular Objectives:

A. Polynomials

- a. Properties of exponents
- b. Add, subtract, and multiply polynomials
- c. Factor and solve polynomial equations
- d. Apply the Remainder and Factor Theorems

Assessments/ Measurement of Objectives:

- Objective tests and quizzes
- Classroom exercises (independent practice)
- Homework exercises

Suggested Methods of Instruction / Learning Activities:

- Direct Instruction
- Drill-and-practice – Classroom exercises
- Independent or cooperative projects
- Authentic application exercises
- Peer tutoring

Unit 6: Rational Exponents and Radical Functions

Estimated Time: 9 Days

Standard Alignment:

- 2.2.11.C. - Evaluate numerical expressions that include the four basic operations and operations of powers and roots, reciprocals, opposites, and absolute values.
- 2.1.11.F. - Understand the concepts of exponential and logarithmic forms and use the inverse relationships between exponential and logarithmic expression to determine unknown quantities in equations.
- 2.5.11.B. - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas, and results.
- 2.8.11.B. - Evaluate and simplify algebraic expressions and solve and graph linear, quadratic, exponential, and logarithmic equations and inequalities, and solve and graph systems of equations and inequalities.
- 2.8.11.D. - Demonstrate an understanding and apply properties of functions (domain, range, inverses) and characteristics of families of functions (linear, polynomial, rational, trigonometric, exponential, logarithmic).

Curricular Objectives:

A. Rational Exponents

- a. Evaluate n th roots and use rational exponents
- b. Apply properties of rational exponents
- c. Use inverse functions
- d. Solve radical equations

Assessments/ Measurement of Objectives:

- Objective tests and quizzes
- Classroom exercises (independent practice)
- Homework exercises

Suggested Methods of Instruction / Learning Activities:

- Direct Instruction
- Drill-and-practice – Classroom exercises
- Independent or cooperative projects
- Authentic application exercises
- Peer tutoring

Unit 7: Exponential and Logarithmic Functions

Estimated Time: 12 Days

Standard Alignment:

- 2.1.11.A. - Model and compare values of irrational and complex numbers.
- 2.1.11.F. - Understand the concepts of exponential and logarithmic forms and use the inverse relationships between exponential and logarithmic expression to determine unknown quantities in equations.
- 2.1.11.C. - Use operations (e.g., opposite, reciprocal, absolute value, raising to a power, finding roots, finding logarithms).
- 2.5.11.B. - Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas, and results.
- 2.8.11.B. - Evaluate and simplify algebraic expressions and solve and graph linear, quadratic, exponential, and logarithmic equations and inequalities, and solve and graph systems of equations and inequalities.
- 2.8.11.D. - Demonstrate an understanding and apply properties of functions (domain, range, inverses) and characteristics of families of functions (linear, polynomial, rational, trigonometric, exponential, logarithmic).
- 2.11.11.B. - Analyze and interpret rates of growth/decay.

Curricular Objectives:

A. Exponential Functions

- a. Graph exponential growth functions
- b. Graph exponential decay functions
- c. Using functions involving e

B. Logarithmic Functions

- a. Evaluate logarithms and logarithmic functions
- b. Apply properties of logarithms

C. Solving Equations

- a. Solve exponential and logarithmic equations

Assessments/ Measurement of Objectives:

- Objective tests and quizzes
- Classroom exercises (independent practice)
- Homework exercises

Suggested Methods of Instruction / Learning Activities:

- Direct Instruction
- Drill-and-practice – Classroom exercises
- Independent or cooperative projects
- Authentic application exercises
- Peer tutoring

Unit 8: Counting Methods and Probability

Estimated Time: 10 Days

Standard Alignment:

- 2.2.11.C. - Evaluate numerical expressions that include the four basic operations and operations of powers and roots, reciprocals, opposites, and absolute values.
- 2.7.11.A. - Use probability to predict the likelihood of an outcome in an experiment.
- 2.7.11.C. - Compare odds and probability.
- 2.7.11.E. - Use probability to make judgments about the likelihood of various outcomes.

Curricular Objectives:

A. Probability

- a. Apply the Counting Principle and permutations
- b. Use combinations and the Binomial Theorem
- c. Define and use probability
- d. Find probability of disjoint and overlapping events
- e. Find probabilities of independent and dependent events

Assessments/ Measurement of Objectives:

- Objective tests and quizzes
- Classroom exercises (independent practice)
- Homework exercises

Suggested Methods of Instruction / Learning Activities:

- Direct Instruction
- Drill-and-practice – Classroom exercises
- Independent or cooperative projects
- Authentic application exercises
- Peer tutoring